

Pathological Findings in the Liver, Pancreas and Parotid Gland in Kwashiorkor

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For a number of years the pathological changes of periportal fatty infiltration of the liver in infants and children dying with kwashiorkor have been known. Often, however, there is no correlation between these changes and the course of the illness in a particular patient. It is suggested by Trowell, Davies and Dean (1954) that the primary lesion may lie in the pancreas, and the liver lesion arises as a result. Normet (1937) and Bablet and Normet (1937) made brief note of changes in other organs, including the pancreas, but did not attach great significance to them. Bras and Clearkin (1954) made note of the pancreatic and liver changes, but felt they were simultaneous occurrences.

It is the intent of this communication to draw attention to the changes in infants dying with kwashiorkor in Southern Rhodesia in the zymogen secreting glands, particularly the pancreas and parotid gland, in which there is a high turnover of protein.

MATERIAL

Eight consecutive cases of infants dying with kwashiorkor are presented. Infants died either on admission to Mpilo hospital or were brought directly to the mortuary. The average age of seven males and one female was 15.75 months. Three died with lobar pneumonia, three with bronchopneumonia, one with a history of diarrhoea and vomiting only and one with no history, lung or other findings other than those related to kwashiorkor as a cause of death.

Characteristic hair changes were found in seven of the eight, skin pallor was found in six, oedema in four and dermatosis in one, while diarrhoea was a symptom in five, two of whom showed clinical signs of dehydration.

FINDINGS

The findings in the three organs are summarised in Tables I, II and III. The patient with central fatty infiltration of the liver was

under treatment for six days and demonstrates the regeneration of the liver starts periportal. This same patient showed a markedly reduced titre of salivary amylase† as compared with other kwashiorkor infants and with normal infants. The pancreas and parotid gland showed marked atrophy and loss of structure in this infant, despite beginning liver recovery.

Table I

LIVER

Gross specimen—	
Enlargement	6
Pale	3
Microscopic examination—	
Fatty infiltration	8
Slight to moderate	2*
Moderately advanced	4
Severe	2
Periportal fibroblast or cellular infiltration	4

* One patient on six days of treatment had central fatty infiltration.

Table II

PANCREAS

Gross specimen—	
Small	2
Soft and friable	6
Microscopic examination—	
Acinar architecture:	
Lost	3
Distorted	3
Atrophy of acinar cell cytoplasm:	
Slight	1
Moderate	3
Severe	3
Round cell infiltration	2
Dilated intercalated ducts	1

† In light of the decrease in zymogen secreting glands, it was felt that some simple index would show the severity of damage to the system, and similarly could be a prognostic tool and an index of recovery of secretory function. The test should be simple and easily made use of in rural areas. I have attempted to quantitate the qualitative test for salivary amylase (ptyalin). Using a 1 per cent. starch solution in saturated saline, eight drops of the subject's saliva are introduced to 2 ml. of solution; serial dilutions are then made until the dilution of 1 drop of saliva to 8 ml. of solution. The solution is then incubated for one hour at 37° C. On a spot plate are placed six separate drops of Gram's iodine, to which are added successive drops of solution. The absence of sufficient amylase is indicated by the sharp end point of the blue-black precipitate of the starch-iodine complex. The time of collection should be standardised, usually just previous to feeding. With a medicine dropper attached to a narrow polyethylene tube, on which the infants are only too glad to chew, one is able to obtain sufficient saliva. At this time, with insufficient trial runs, I do not consider the test of diagnostic significance, except in the most extreme cases. Limited studies show a lower level of amylase in infants with kwashiorkor.

* Dr. Mark A. Belsey, while still an undergraduate, was awarded a scholarship to study tropical disease. He selected the Federation, where he spent a sub-batical year as a Medical Student Fellow of the National Foundation, New York. The present study was thus undertaken when Dr. Belsey was still a student.

Table III

PAROTID GLAND (SEVEN CASES)

Microscopic examination—	
Acinar architecture:	
Lost	1
Acini small	2
Decreased cytoplasm	4
Round cell infiltration	2

DISCUSSION AND CONCLUSIONS

Bras and Clearkin (1954) demonstrated similar pancreatic changes in ten out of eleven infants and children with kwashiorkor in Jamaica, B.W.I. In the same series they found pancreatic changes in 15 out of 22 infants and children with fatty livers. These later cases were not felt to be sub-clinical cases of kwashiorkor because they lacked the periportal distribution of fatty infiltration characteristic in kwashiorkor. Fibrosis, infiltration and widening of the intercalated ducts in the pancreas were found only in those with kwashiorkor—a finding similar to that here presented. In several cases of gastroenteritis examined for comparison, no changes were found in the pancreas and minimal fatty infiltration was found in one specimen of liver.

Adams *et al.* (1958) and Follis (1957) have demonstrated experimentally similar lesions in rodents (rats and mice) and monkeys respectively on diets of cassava and maize respectively. Atrophy, loss of zymogen and stainable protein, without change in the ribonucleic acid which is vital in protein production, were found in pancreas, liver, peptic cells of the stomach. Paneth cells and in salivary glands of rats and mice. Pancreatic changes were not demonstrable in the monkey. Liver changes in both studies were characteristically periportal fatty infiltration.

SUMMARY

- (1) Eight cases of kwashiorkor are presented, six of whom had either diagnosis or autopsy findings of pneumonia.
- (2) Seven infants showed periportal fatty infiltration. The eighth showed periportal recovery of the liver while under treatment.
- (3) Seven of the eight showed pancreatic changes consisting minimally of atrophy of the acini cell cytoplasm.
- (4) Four out of seven showed some atrophic changes of the parotid gland.
- (5) One case premonitory demonstrated a marked decrease in salivary amylase secretion and marked atrophy of parotid gland and pancreas on autopsy.

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